

## Homework 4

Due Wednesday, September 23

WMMY: Ch 3 # 43, 47, 51, 60, 65  
Ch 4 # 1, 5, 7, 13, 17, 23, 29

Problem A: Roll two dice, let  $X$  be their sum, and let  $Y$  be the larger value minus the smaller value (as in Hwk 3 Prob. A). Make a table displaying the joint probability distribution function of  $X$  and  $Y$ . Are  $X$  and  $Y$  independent?

Problem B: Let  $f(x,y) = e^{-x-y}$  when  $x > 0$  and  $y > 0$ , and zero otherwise.  
a. Check that  $f$  is a joint PDF.  
b. Compute the marginal PDFs for  $X$  and  $Y$ .  
c. Are  $X$  and  $Y$  independent?

Problem C: Let  $D$  be the diamond shaped region  $|x|+|y| \leq 1$  in the plane, and let  $f(x,y)$  be the uniform PDF on  $D$ . That is,  $f(x,y) = 1/2$  for  $(x,y) \in D$  and  $f(x,y) = 0$  otherwise.  
a. Check that  $f$  is a joint PDF.  
b. Compute the marginal PDFs for  $X$  and  $Y$ .  
c. Are  $X$  and  $Y$  independent?

Problem D: Flip a coin until you get tails. What is the expected number of flips?

Try it at least 30 times, and find the mean number of flips. Does it seem to agree with your expected number?

(Better still, get together with a friend or two and try it 100 times).